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AUTHOR Psacharopoulos, George; Tzannatos, Zafiris
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ABSTRACT

Statistics have created an arbitrary, confusing distinction between a labor force participant and an nonparticipant; women were relegated to a second class employment citizenship that failed to recognize household production and assigned them a lower participation rate relative to males. Despite these shortcomings, such statistics can prove useful. After a brief introduction, the second section of this paper compiles and discusses trends in female labor force participation in 136 countries. Section III reviews labor supply models helping to explain women's decision to seek jobs. Section IV explores factors possibly responsible for differences in the female labor force participation rate among countries and through time, with special emphasis on education's role. Section V examines two related questions. First, are educated women more likely to participate in the labor force than uneducated ones? Second, will educated women participate for longer periods than uneducated ones? Results suggest that education positively affects the incidence of female labor force participation and women's lifetime length of participation in the labor market. In fact, an extra year of schooling results in two more years of participation. This finding is discussed in the context of alternative policies that may increase femals' role in economic activity. Included are 27 references and appendices offering statistical data and explanations of terms. (MLH)

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EDUCATION AND FEMALE LABOR FORCE PARTICIPATION

by

George Psacharopoulos
Zafiris Tzannatos

U.S. DEPARTMENT OF EDUCATION
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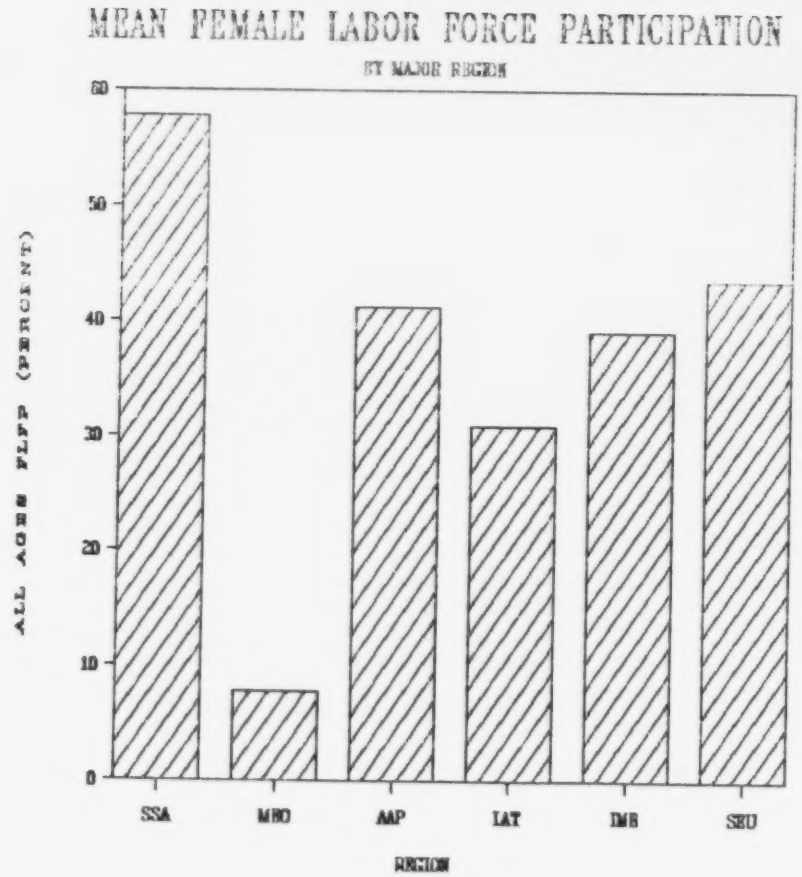

SSA = Sub-Saharan Africa
MEO = Middle East, North Africa and Oil Exporters
AAP = Asia and Pacific
LAT = Latin America and Caribbean
IME = Industrial Market Economies
SEU = Southern Europe

Abstract

The paper compiles and discusses trends in female labor force participation in 136 countries. Differences between countries in the female participation rate are related to the level of educational development and other socioeconomic variables. The results suggest that education has a positive effect on the incidence of female labor participation and also on a woman's lifetime length of participation in the labor market. This finding is discussed in the context of alternative policies that may increase the role of females in economic activity.

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I. Introduction

Since time immemorial, and certainly before statistics were invented, women have been engaged in all kinds of economic activity. In the early ages of the human race, the dominant form of such activity was family-based agricultural production and human reproduction -- the term "household production" had not yet been invented.

Then statistics came and put an arbitrary and highly confusing distinction between a labor force participating person and non-participant. This immediately classified women into a second class employment citizenship, in the sense that their labor force participation rate appeared to be lower relative to that of males. It was only recently that neoclassical economists reddressed the obvious, namely that women are contributing to production whether they are classified or not as labor force participants in the narrow official statistics. 1/

1/ In the contemporary jargon, the "economically active population" comprises all persons who furnish the supply of labor for the production of economic goods and services as defined by the United Nations systems of national accounts. According to this system the production of economic goods and services should include all production and processing of primary products, whether for the market, for barter or for own consumption, the production of all other goods and services for the market and, in the case of households which produce such goods and services for the market, the corresponding production for own consumption. (ILO, 1985, p. 3).

In spite of these shortcomings, female labor force statistics are of interest on several counts. First, they highlight the distinction between dependent employment and household based production. Second, this distinction links to differential productivity of household based versus dependent employment activities. Third, the age distribution of the female labor force participation rate statistically relates to the female enrollment ratio by level of schooling -- the higher the current school enrollment ratio of a given age group, the lower is its participation rate. Lastly, and to the extent that productivity in dependent employment is higher relative to home production, labor force participation statistics can assist in the formulation of policies for increasing the role of females in economic activity in general.

The following section presents an international compilation of statistics on female labor force participation by age and over time. Section III reviews labor supply models which help explain the decision of women to seek jobs. Section IV explores the factors that may be responsible for differences in the female labor force participation rate between countries and through time, with special emphasis on the role of education. In Section V an attempt is made to answer two related questions: first, are educated women more likely to participate in the labor market than uneducated ones? Second, will educated women participate for longer periods in the labor force relative to the uneducated? The last section attempts to draw some conclusions regarding the desirability of policies for increasing female labor force participation.

II. The Evidence

In this section we present summaries of the female labor force participation rate in different regions of the world and over time. We shall reserve explanations of the patterns observed to Section IV, below.

One word of caution is due at the outset. As all original sources of female labor force participation warn, the data are of uneven quality, especially for comparability of rates between countries, and also within countries over time.

International Cross-Section

Appendix Table A-1 provides a compilation of the available statistics on the labor force participation rate in 136 countries. Table 1 summarizes the overall female participation rate by age and country income group. The overall pattern is one of increasing female participation up to the middle age and decreasing thereafter (see also Figure 1). Female participation peaks at the two extremes of per capita income, and is lowest for the middle income group countries.

Table 1

Female Labor Force Participation Rate by Country Income and Selected Age Group (Percent)

Country Income Group	All Ages	15-19	20-24	30-34	40-44	60-64
Low Income	54	39	48	50	50	37
Middle Income	31	26	45	45	42	23
Industrial	39	40	70	60	61	23
World	41	35	54	52	51	28

Source: Appendix Table A-1.

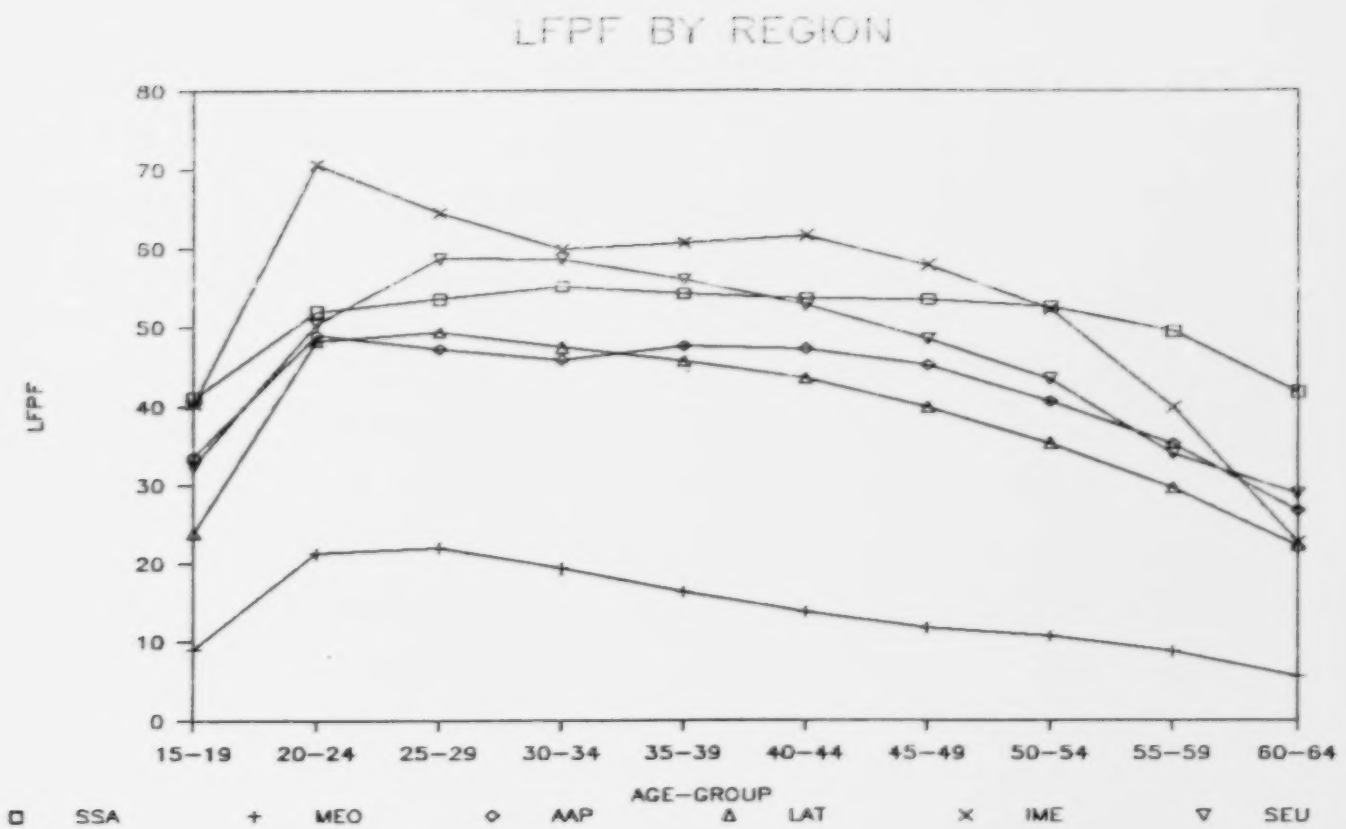

Figure 1. Mean Female Labor Force Participation by Age and Region, 1980s.

SSA = Sub-Saharan Africa
MEO = Middle East, North Africa and Oil Exporters
AAP = Asia and Pacific
LAT = Latin America and Caribbean
IME = Industrial Market Economies
SEU = Southern Europe

Over Time Trends

Table 2 gives the overtime pattern of female participation. The aggregate figures in this table, and subject to the qualifications mentioned earlier, give an intriguing picture of the global changes in female participation. Namely, whereas the overall participation rate has remained almost constant between 1960 and 1980-85, it has increased in advanced industrialized countries and decreased in developing countries. The data of course do not distinguish between full-time and part-time employment. It is probable that the rise in the labor force participation rate in advanced countries is due to the widespread introduction and availability of part-time work, as in the case of Britain (Zabalza and Tzannatos 1985, Joshi et al. 1985).

Table 2

Overall Female Labor Force Participation Rate
by Level of Development and Year

Country Type	1960	1970 (Percent)	1980[1/]	Percentage Change 1960-80
Developed	52	55	57	+10
Developing	45	44	42	-7
World	47	47	46	-2

Source: Sivard (1985), Table 2.

Note: [1/] Refers to latest year, mostly in the early eighties.

III. Theoretical Models

Female labor force participation has long occupied the social science literature. The explanations put forward can be clustered into two main groups. First, what we shall label the sociological-cultural ones and second the economic ones.

According to the first model, social custom dictates whether a woman would seek employment outside the home. Religious, anthropological, historical and other factors are dominant in explaining female participation (Amsden 1980). According to the second model, economic considerations dominate the participation decision. Of course the two explanations are not mutually exclusive. What may appear the result of tradition might in fact have been influenced by concomitant economic forces. This is the reason why, within the economic school there are more than one explanations known as the neoclassical, institutional, marxist and radical economic theories.

In recent years economists seem to have lucidly accommodated participation into a general theory of labor supply (Mincer, 1962, Becker 1965, Gronau 1977). This can be explained by reference to Figure 2. A woman has a maximum amount of time T available per time period (say hours per day or years per lifetime). Starting from T, this resource can be transformed to household goods and services by moving along the TC production possibility curve. The particular shape of such curve is due to the assumed diminishing returns to each extra unit of time devoted to home production.

At some point, moving from T to C, the woman's productivity at home (the slope of the transformation curve) may become less that what she can earn by working in the market. This is point A in Figure 2, where her

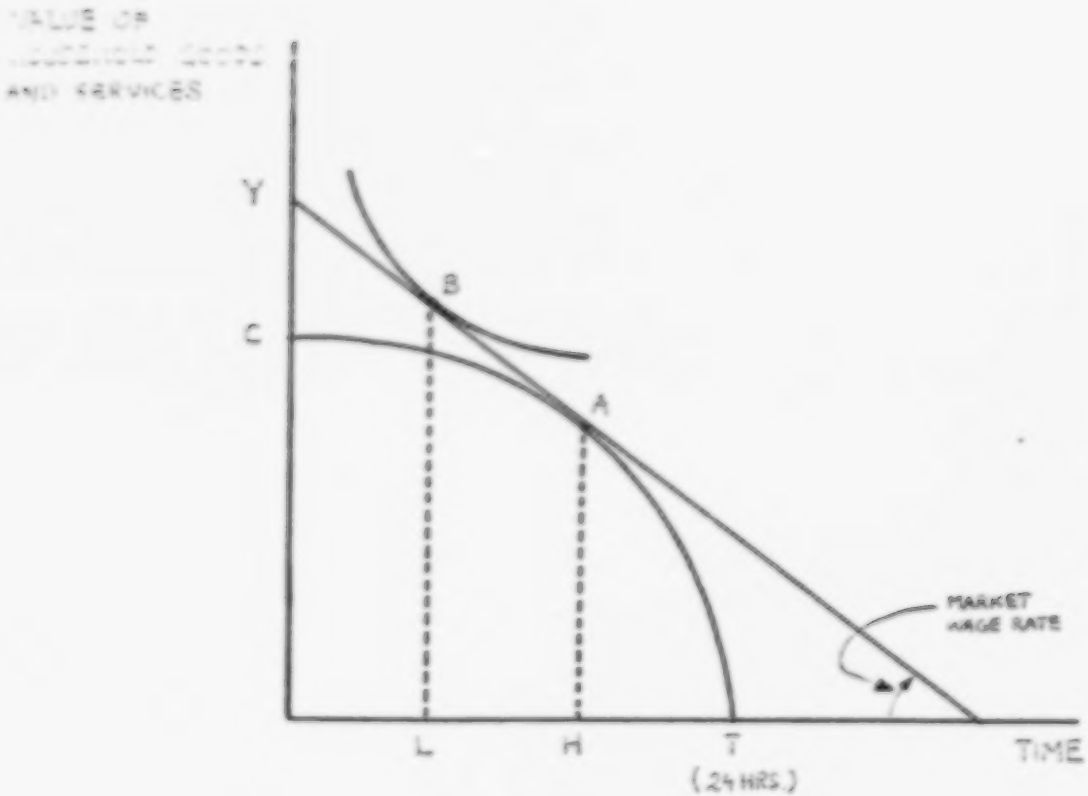

Figure 2. The Allocation of a Woman's Time between Home and Market Work.

effective production possibility curve becomes TAY. From that point onwards it is more profitable for the woman to stop allocating time to household activities and enter the labor market. Where she will stop working, for either the home or the market, depends upon her tastes regarding leisure versus consumption (or equivalent income). In the case of Figure 2 this occurs at the tangency of the budget constraint to the highest indifference curve (Point B). This particular woman will eventually allocate TH of her available time to home work, HM to market work and MO to leisure. Thus, according to the neoclassical school, the critical factors affecting a woman's decision to participate in the labor market are:

a) the relative rewards for market and home work and

b) her tastes

The above model could in fact apply to individuals of either sex. But in the case of married women (i.e., the majority of women) the decision to participate or not in the labor force is taken within a family context. In particular, the availability of husband's income may induce her to work less, other things being equal, and on the reasonable assumption that leisure is a normal good. This is known in the literature as the "income effect" which tends to reduce female labor force participation, whereas the above mentioned relative rewards argument is known as the "substitution effect" i.e., an increase in the woman's own wage (market or shadow) induces her to work less.

The neoclassical argument regarding female labor force participation is based on the operation of the market and the attempt by individuals to maximize their welfare, which is defined as economic well-being. Since the early 1970's there have been attempts to incorporate cultural and non-economic factors explicitly into the economic models (e.g. Akerlof). Such attempts, however have fallen short of the emphasis of "institutionals" on the importance of non-economic factors regarding female participation. This school focuses on the family as an institution and the relationship between husband and wife regarding the division of labor between house and market work. Within this framework the specialization between men and women and hierarchy (higher earnings for men than for women) eventually lead to the observed differential behavior between the sexes. This is further intensified by the extent to which the labor markets are stereotyped and occupational segregation or discrimination applies. Institutionalists also emphasize demand-side explanation, i.e., the availability of job opportunities for women. (Amsden 1980, pp. 18-23).

In the marxist view of the world, women are seen as forming part of the reserve labor army who serve as shock absorbers of the stop-go capitalist production and accumulation. The issues of female participation and sex discrimination do not receive particular attention as such as the focus is not on the male versus female worker, but on the worker versus the owner of the means of production in general (see Sokoloff, 1980 for a review of Marxist theories).

IV. Explaining the Evidence

The difference in the overall participation rate between industrial and developing countries could be due to statistical, economic, institutional, demographic and other factors.

Statistical

It may well be that women participate more in production at large in developing countries. However, a great part of the production activities of the latter is not classified as labor force participation because of the lack of a social security or other recording system.

Demographic

The overall participation rate depends on the age structure of the population, as different age groups have different propensities to participate. For example aged societies will have lower participation rates, ceteris paribus, relative to societies where young people are predominant.

Institutional

Due to the lack of an established pension system in developing countries, older persons have to work in order to sustain themselves. Also younger women in industrialized countries are free from older parents' care and can devote more time to market relative to their LDC counterparts.

Cultural

It is well known that in some societies religion exerts a strong influence upon individual and household behavior. The Middle-East profile of the labor force participation rate exemplifies this (Figure 1). Also, religion alone explains one third of the cross-country variation in the overall female labor force participation rate (Appendix D).

Economic

Following the theoretical framework outlined in the previous section the relative rewards of household versus market activities and income are perhaps the key factors in understanding differences in the labor force participation of women. In fact, the over time rise in the female labor force participation rate in DCs has been convincingly attributed to the increase in female market real wages. Of course such substitution effect working towards increased participation must have been dampened by the concurrent rise in male real wages (Mincer 1962).

These supply side factors have to be weighted against demand conditions such as the changing composition of production away from agriculture and towards manufacturing and services, and the changing the composition of manufacturing into industries that traditionally employ men rather than women. Also on the demand side, sex discrimination is often cited as a major factor which reduces female labor force participation, e.g. by discouraging women to seek employment.

Development is associated with urbanization which increases the relative price of children, which in turn results in women working less in the labor market.

Education

Female education affects participation in a number of ways. First, it is well known that education increases the market productivity of the worker, hence the over time rise in education induces substitution of market for home work. Second, the increased female income may be allocated back to "buy" non-working time. Therefore, the net effect of education on the length of working time is a priori ambiguous. But the extent to which education can be seen as investment, it will induce a woman

to work in the labor market in order to recoup the costs of her investment. Of course this proposition holds only if market work is associated with higher rewards relative to working at home . The fact that at least some women work in all countries under consideration testifies to this assertion.

These arguments lead to two conclusions. First, education rotates clockwise the market budget constraint in Figure 2 so that, other things being equal, educated women will spend less hours on home work i.e. education increases the incidence of participation or it decreases non-participation. However, it is not clear on a prior grounds whether the time spend on market work by an educated woman will be more, less, or the same as her uneducated counterpart. One can rationalize this on the grounds of income and substitution effects. For any level of education to be undertaken, the rate of return compared to the basic (shadow) wage must be positive. This implies that non-work has become more expensive and the educated woman will substitute work for non-work time. However, the increase in the value of consumption is faster over time than that of the uneducated woman which in turn implies that after some critical point of time the educated woman will have more income than her uneducated counterpart i.e., she will now be able to afford to have overall more non-working time. The second conclusion is therefore that the effect of schooling upon the time spent in work may be positive, negative or none. Which of the three will prevail depends, in this simple model, on the woman's preferences (indifference map), the difference in productivity (wage differential) between educated and uneducated workers and also the level of unearned income.

For the individual woman, schooling may be the result of different considerations which will in turn affect her behavior. Consider for

example the following interrelated questions: is education a consumption or an investment good? If the latter, is education an investment which will lead to a better job and more work or a "better" marriage and more leisure? In Sudan, for example, educated girls retire into seclusion when they have finished their education (Boserup, 1970). In advanced countries "the motivation to go to college and motivation to use college training do not seem to be linked" (Epstein, 1970). In the past most of the less educated (working class) women worked while relatively few educated married women did so in the United Kingdom or the United States (Standing, 1981). In fact there have been many scholars who did not hesitate to describe education as a generator of unemployment (see Myrdal, 1968 on the "bourgeois problem" of South-East Asia or Kamarck, 1967 on "sociological unemployment" in Africa). Finally, one can mention the "status frustration" whereby an educated woman may withdraw from the labor force if she feels disappointed with the job which the prevailing socio-economic conditioning allow her to have (Blaug 1974).

The third conclusion is therefore that for the individual woman the observed relationship between schooling and work may be positive, negative or none at all. Unless more information becomes available about her (unobserved) motives, aspirations, expectations and so on, any conclusion is bound to be circumstantial. However, from the analytical point of view one can safely assume that at least some part of the decision to acquire education is influenced by investment in human capital considerations. Like investment in capital by firms, investment in education involves both a cost and a stream of benefits which accrues over a period of time. From this observation the literature on human capital breaks into two categories. First, the Mincerian approach which by and

large is based on the assumption of present value maximazation and, second, the Beckerian approach which attempts to explain the consumption and labor supply patterns of households through the use of household production functions. Nevertheless, the conclusions of the two approaches are fairly comparable: the female allocation of time is dependent upon relative costs and benefits, as well as initial enrollments.

V. Findings

In this section we attempt to estimate the relationship between schooling and participation in 136 countries during the early 1980s. The sources and definitions of the data used in the econometric analysis are explained in Appendix B.

We tackle two of the three issues raised in the previous section, i.e. what is the effect of education on (a) the incidence of participation, and (b) the duration of participation over a woman's lifetime. The third issue, namely the effect of non-economic considerations upon female market work and education, has been implicitly taken into account through a number of social indicators that have been used to control for differences in preferences and conditions across countries.

Are Educated Women More Likely be in the Labor Force than Uneducated Ones?

We answer this question by regressing the logarithm of the female labor force participation rate on an instrumentalized literacy rate variable. In this specification the coefficient of the literacy rate can be interpreted as the percentage difference between the participation rate of educated women to the corresponding rate of the illiterate women (the justification for this procedures is explained in Appendix C). The result was as follows (values in parenthesis are t-ratios).

$$\ln(LFPR) = \underset{(7.95)}{-1.46} + \underset{(1.98)}{0.54}\ (\text{Literacy rate}) \qquad R^2 = .04$$

The justification for using instrumental least squares rather than OLS is the fact that, as explained above, the decisions to undertake education and work in the labor market are not independent of each other. The instrumental variables used to predict the literacy rate in our case were:

- education expenditure as a percentage of public spending. This is rationalized because the higher the value of this variable, the less costly is the private cost of education and hence, it is easier for a woman to afford to undertake education;
- the percentage of labor force in agriculture, as employment in agriculture reduces the returns to education (agricultural labor is much more homogeneous than labor in industrial tasks or in services);
- the urbanization rate, which relates positively to the availability of schools and also affects tastes;
- a dummy variable having a value of one if the country is a non-market economy; and
- eight regional dummies for Africa, Middle-East, South Asia, East Asia, Oceania, Latin America, North Europe and South Europe (the control region was North America).

The results of this exercise indicate that literate women participate in the labor market 54 percent more than illiterate women. In our sample the average female participation rate is around 40 percent which can be interpreted as 40 women out of 100 being at work at a given point of time. Also in our sample the mean literacy rate is 65 percent. Therefore literate women have a participation rate of 46 percent and illiterate women a rate of 30 percent (see equation 2 in Appendix C).

It is difficult to assert whether the 54 percent impact of literacy upon participation is high or low. Perhaps one can say very little more on this given the level of aggregation in our sample. However, one should not dismiss this estimate on the grounds that the most illiterate countries also have the highest female participation rates. As

stated earlier it is too simplistic to try to evaluate the impact of education upon labor supply by looking only at the aggregate relationship between the two. It is reasonable to assume that a strong income effect is in operation in LDCs: per capita incomes are low in these countries, hence women struggle for survival and work as much as they can. Furthermore, the explanatory power of the regression (and of the literacy rate in this case) is low (4 percent). This is not rare in economic models of education: even individual data fail to explain more than few percentage points of the variation of earnings in a human capital framework (Mincer, 1976; Psacharopoulos and Layard, 1979). Thus the observed negative relationship between literacy and high participation rates can be reconciled on grounds that other effects such a as income have not been taken into account.

Do Educated Women Spending more Years in the Labor Force?

In order to answer this question we approximate the length of time spent in the labor market as

S = LFPR (LIFEXP - 15)

i.e., by multiplying the female labor force participation rate by the female life expectancy after subtracting from the latter 15 (the conventional age below it is assumed that women do not join the labor market (Bowers, 1986).

The length of time a woman spends in the market depends on how many years of schooling she has. One would expect that the more time a woman has spent in acquiring education, the more it will take, ceteris paribus, to recoup the costs of such an investment. Therefore, female labor supply in years should be a positive function of the length of education. The latter can be approximated by multiplying the female enrollment ratios in a given country by the years of education per level

(6 for primary and secondary, and 4 for tertiary education) and then by summing up the three products. This measure may be unsatisfactory on at least four counts. First, the construction of this variable assumes no drop-out within each level of education. Second, it assumes that the present enrollment ratios are also applicable to older generations of women. Thirdly, tertiary education is underestimated in the case of LDCs as in some countries there is no tertiary education available at home although women do undertake university education (e.g. Cyprus). Finally, what may be important is not only the length of education a woman has but also the type of such education. The argument here is that women undertake the types of education that depreciate relatively slower as they expect to drop out of the labor market for family purposes (Mincer and Polachek, 1974). However, this is the least important of the problems mentioned so far as sex roles are so stereotyped that our failure to standardize for type of schooling should affect our results less than the previous three reasons.

The regression results of the <u>length</u> of participation (in years) upon the length of schooling are presented in Table 3. Again schooling was instrumented by the same variables as in the previous regression. However, a number of other variables was also included for the reasons mentioned below. As the dependant variable is measured in years it is obvious that the length of female life is an important determinant of the former variable. For example, other things equal, women in Japan have a life expectancy of 80 years while those in Chad only 44 years. Even if the female populations were identical in the two countries, women in Chad would work less years than those in Japan. Hence, the female life expectancy was included as an additional regressor. Urbanization was also included

because it is an important demographic-economic determinant of female labor supply. Finally, and according to the discussion presented in Section IV we introduced two variables (in 0 - 1 dummy form) which relate to the level of per capita income of each country (the control country variable was high-income). Whereas urbanization may proxy the relative price of participation, the latter two variables are proxies for income.

The results shown in Table 3 indicate that indeed urbanization is associated with shorter female participation in the labor market. The elasticity of the length of time spent in the market with respect to the urbanization rate is -.52, i.e. a 10 percent increase in urbanization will result in a 5 percent decrease in the time spent in market work (in our sample participation will be reduced by almost one year).

Table 3

Explaining the Length of Participation: Instrumental Least Squares

Variable	Coefficient
Constant	-5.05
Urbanization	-20.86**
Life Expectancy	.32**
Low Income	5.47
Middle Income	-4.78
Years of Schooling	2.00**
R^2	.23
N	114

Notes: ** significant at the 5 percent level.
Instruments used for predicting the length of schooling: expenditure of education as percentage of public spending, urbanization rate, percentage of population in the 15-64 age group, and dummies for communist countries, Africa, Middle East, South Asia, East Asia, Oceania, Latin America, North Europe, South Europe (control North America).

The female life expectancy is also important. An increase in the life expectancy by one year will increase the time spent in the market by .32 years (almost four months). This is intuitive as an increase in life expectancy results in more older women, i.e. women who for many reasons (such as physique, availability of pensions, past savings) have a smaller propensity to work than younger women.

The two income variables have the expected signs, i.e. they conform to our previous assertion of a U-pattern from the subsistence to the advanced industrial economy. Given that the omitted countries are the advanced ones, our estimates indicate that the longest attachment to the labor force occurs in the least developed countries (after controlling for differences in the length of women's life). Then in the middle-range of per capita income labor supply deepens and recovers only half of its previous level when the economy reaches its advanced industrial state. However, one cannot put to much trust in the two income coefficients as they were both insignificant.

The coefficient of education is both positive and significant and indicates that an extra year of schooling results in two more years of participation. This is an important result which we will pursue further in the next section.

VI. Conclusions

In this paper we concentrate on the quantitative relationship between schooling and female labor force participation from an economic point of view. Our results indicate that there is a positive effect from the former upon the latter. However, education appears to be only one of the many factors which affect women's decision to supply labor to the market place. Other factors such as religion, custom, and demographic characteristics exert a significant impact on participation. One can therefore say that policies which aim at increasing the proportion of women who are engaged in paid employment are bound to have a limited affect if they concentrate on only one of these factors. Nevertheless, educational policies may eventually prove more effective that our results suggest in that there will also have an indirect impact on the broader socioeconomic environment. Consider, for example, a developing country where an educational policy is introduced which aims at increasing the availability of school places and/or enforces compulsory education. Let us for the time being ignore the current costs of such policy and concentrate on its future effects.

The direct effects of this educational policy upon participation would be first to increase the number of girls seeking employment outside the home and, second, to increase their lifetime work. The economic justification for this is that no matter whether the cost of education incurred voluntarily or not, women will ex post try to recover their costs and this can only be done if they engage in a more productive activity.

There will also be a number of effects on fertility. Peasant economies are characterized by widespread family and street work, partly

because child labor is abundant. The educational policy will first reduce the availability of child labor as a source of family income. Second, there will be fewer girls to look after their younger siblings. (These two effects will increase the price of children). Thirdly, girls may enter their fertility cycle at a later part of their lives (thus the natural fertility rate will be reduced). Fourthly, women will find that home work and child care have a higher opportunity cost, if they work in the market. Fifthly, women, if educated, will be in a much better position to practice contraceptive techniques. Sixthly, as education is negatively associated with infant and child mortality, the woman will not have to go through the ordeal of repeated pregnancies as often as when uneducated, thus she will have more time available over her lifetime.

There will also be qualitative effects of such educational policy upon labor supply. The family's health and meal preparation (from the fields to the table) are tasks which have been traditionally carried out by women. The woman's education will improve the physical well-being of all the family members. The impact of poor health upon labor supply is better realized by the fact that even in advanced industrialized countries the percentage of work days lost per year due to acute conditions for usually-working persons is around 5 percent, while in some developing countries this statistic exceeds 10-20 percent. (Standing, 1981, p. 93).

Thus, both the direct and indirect quantitative and qualitative benefits of education upon labor supply are important. Against these one has to consider the costs of such policy. These can be the current direct cost of providing education, plus the inefficiency induced if a given policy is compulsory and individuals or households are assumed to be

rational and non-myopic, and if also it is assumed that markets are perfect. This is not the place to reproduce the debate on cost-benefit analysis and desirability of education from a social point of view. (It has been shown that women's education if often a better investment than that of men, Psacharopoulos 1985, Table 5). However, our analysis and results suggest that an expansion of the opportunities for education for women will ceteris paribus have far-reaching effects (see also Selowsky 1983). Whether these effects will eventually prevail will very much depend upon the demand side of the labor market, an issue not dealt with in this paper. What is for sure, is that if sex stereotypes within the family and the market place do not change in pace with educational expansion, then the effect of educational policies will be limited.

This is perhaps all one can say say at this level of aggregation. Policies should be fine tuned to the specific country conditions, which in turn depends upon the availability of an adequate data base. Micro analyses based on individual (rather than cross-country) observations are in order to assist a country in policy formulation in this area.

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APPENDIX TABLE A-1

FEMALE LABOR FORCE PARTICIPATION RATE BY AGE AND COUNTRY TYPE
(PERCENT)

LOW-INCOME ECONOMIES

COUNTRY	YEAR	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	ALL AGES
BANGLADESH	84	7.0	8.7	7.7	8.6	9.4	8.1	8.4	8.7	7.1	4.4	22.0
CHAD	80	22.0	28.1	28.0	28.0	28.0	28.0	25.2	25.6	25.6	13.1	31.0
CHINA	82	77.6	80.3	86.6	86.6	86.5	83.3	70.6	60.9	32.9	16.9	66.0
COMOROS	80	14.1	20.3	22.9	24.4	25.3	26.2	25.8	25.5	23.8	21.2	.
ETHIOPIA	84	57.9	61.0	63.7	65.5	62.9	60.8	56.8	50.1	41.2	33.8	59.0
GAMBIA	83	61.9	58.3	71.1	73.9	74.6	77.2	75.3	76.2	72.4	71.5	87.0
GUINEA-BISSAU	79	2.2	4.0	3.2	2.7	2.3	2.3	2.3	1.8	2.2	1.7	72.0
HAITI	82	35.1	53.5	56.7	55.5	58.4	57.5	60.2	57.8	54.2	46.6	91.0
INDIA	*81	26.5	29.2	32.1	34.7	36.4	36.0	36.0	29.8	29.8	14.0	50.0
MADAGASCAR	75	58.2	69.3	78.1	78.4	79.0	79.4	82.5	82.9	76.7	76.7	92.0
MALAWI	83	79.0	85.6	90.1	88.3	91.6	90.0	90.5	89.4	89.8	84.3	67.0
MOZAMBIQUE	*80	68.8	87.6	91.4	91.4	91.4	92.7	92.7	92.7	92.7	82.0	38.0
NEPAL	81	51.3	47.6	44.9	43.3	44.1	44.7	44.9	44.7	43.3	39.9	73.0
NIGER	77	9.3	6.5	6.5	7.1	8.0	9.1	10.2	10.1	10.4	8.0	11.0
PAKISTAN	85	10.9	11.6	13.2	12.3	12.5	14.0	12.3	10.4	9.2	7.2	11.0
RWANDA	*78	88.2	96.1	97.1	97.4	98.0	98.0	97.2	95.3	90.9	81.7	103.0
SRI LANKA	81	19.0	36.8	36.5	33.9	32.1	28.7	25.6	19.8	13.3	7.8	30.0
SUDAN	73	18.1	18.5	20.3	21.4	24.1	27.0	28.1	28.8	27.4	26.4	12.0
TANZANIA	78	53.4	86.0	90.3	93.1	94.2	94.9	94.9	93.0	90.8	84.0	63.0
MEAN		39.7	47.8	49.6	49.9	50.6	50.4	49.4	47.0	43.9	37.9	54.3
STD		27.3	31.3	32.4	32.6	32.7	32.3	32.0	31.7	31.3	30.9	29.1

continued

APPENDIX TABLE A-1

continued

MIDDLE-INCOME ECONOMIES

COUNTRY	YEAR	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	ALL AGES
ALGERIA	*82	1.4	9.7	9.7	4.6	4.6	4.6	4.6	4.6	4.6	1.8	4.0
ARGENTINA	85	24.6	46.7	41.3	37.9	35.7	34.1	30.9	26.1	18.0	9.9	27.0
BARBADOS	83	34.7	79.5	83.0	77.5	76.5	72.2	73.1	58.2	45.1	29.2	55.0
BOLIVIA	85	21.5	26.8	27.7	26.3	24.7	24.3	23.3	21.3	19.0	16.8	23.0
BOTSWANA	*85	42.0	74.7	76.9	76.9	73.5	73.5	69.5	69.5	60.5	60.5	95.0
BRAZIL	*80	31.2	39.1	35.9	34.2	34.2	30.0	30.0	21.4	21.4	10.3	21.0
CHILE	83	11.6	42.0	44.3	43.7	41.5	37.1	34.7	28.1	19.5	13.6	25.0
COSTA RICA	*84	20.8	33.7	33.7	35.4	35.4	27.2	27.2	16.3	16.3	8.7	20.0
CUBA	81	15.5	45.6	51.7	52.8	52.1	48.9	40.8	30.9	18.1	7.8	.
EGYPT	*83	12.6	21.9	20.6	19.9	19.9	13.7	13.7	13.7	13.7	5.9	8.0
FIJI	*82	22.8	22.8	22.9	22.9	22.9	22.9	17.0	17.0	17.0	17.0	7.0
GREECE	*84	22.9	45.9	48.9	49.3	47.5	44.6	44.6	36.1	28.1	22.7	42.0
GUATEMALA	81	13.0	16.9	15.9	15.3	14.0	13.6	12.2	11.7	10.0	8.8	15.0
GUYANA	80	21.3	36.3	33.2	30.2	27.4	27.0	26.9	25.4	21.8	15.1	28.0
HONDURAS	84	16.1	23.5	22.5	21.0	19.5	17.1	15.7	14.3	13.2	10.9	15.0
HONG KONG	85	35.3	83.2	68.8	52.7	52.2	54.2	51.8	41.6	30.8	24.8	40.0
INDONESIA	80	31.1	33.2	36.1	38.5	42.3	45.1	46.2	44.7	40.1	32.0	36.0
IRAN	82	8.8	19.6	18.8	14.8	10.9	7.5	4.9	4.0	3.5	3.0	13.0
IRAQ	77	10.9	15.5	19.0	20.8	19.2	19.3	18.6	18.3	16.5	13.0	4.0
ISRAEL	*83	31.4	31.4	58.6	58.6	56.2	56.2	47.2	47.2	29.9	29.9	31.0
JAMAICA	*82	38.9	83.3	88.1	88.1	86.9	86.9	82.7	82.7	67.8	67.8	49.0
JORDAN	79	3.4	15.7	13.5	8.7	5.2	3.3	2.4	2.0	1.8	1.1	5.0
KOREA, REPUBLIC OF	85	18.6	49.1	35.9	43.2	55.8	60.0	61.8	55.9	50.7	38.0	32.0
MALAYSIA	80	33.9	52.6	43.9	40.7	43.0	44.1	42.2	37.6	32.5	26.7	37.0
MEXICO	80	26.8	37.3	34.9	32.5	31.3	30.2	29.1	27.5	25.8	24.1	18.0
MORROCO	82	19.0	20.4	20.9	17.7	16.2	14.7	14.1	14.6	14.6	11.2	11.0
PANAMA	80	16.8	38.3	41.6	40.2	38.1	35.3	30.8	22.6	15.0	7.2	27.0
PARAGUAY	82	20.1	28.0	28.1	25.7	24.9	23.8	21.6	18.2	16.0	12.7	27.0
PERU	81	18.1	29.3	31.1	30.7	28.7	27.3	26.1	25.4	23.2	23.0	25.0
PHILIPPINES	*85	31.4	47.6	53.4	53.4	60.0	60.0	58.9	58.9	49.1	49.1	52.0
SENEGAL	85	54.0	54.9	61.4	98.1	67.7	56.7	73.5	72.3	68.0	58.8	68.0
SINGAPORE	85	33.8	78.9	66.5	48.6	44.7	39.6	36.3	25.9	18.4	11.9	27.0
SYRIA	83	9.5	13.5	13.9	10.4	11.3	9.0	7.7	6.9	4.5	2.6	10.0
THAILAND	*82	72.4	81.7	87.2	88.7	90.1	88.9	88.9	79.0	79.0	31.7	95.0
TRINIDAD AND TOBAGO	*85	24.2	50.2	51.8	51.8	49.2	49.2	41.9	41.9	33.3	23.1	34.0
URUGUAY	**84	26.1	65.6	64.9	65.2	61.4	61.3	54.3	43.6	31.1	17.3	31.0
VENEZUELA	81	18.5	35.8	39.5	39.9	39.0	35.7	28.9	23.4	16.6	10.7	22.0
YUGOSLAVIA	***81	10.1	58.8	68.4	67.4	61.2	54.2	47.9	37.7	27.8	22.1	49.0
ZAMBIA	*84	44.9	29.8	24.0	24.1	24.1	24.1	34.4	42.3	37.6	37.6	52.0
MEAN		24.4	41.5	42.0	41.2	39.7	37.9	36.3	32.5	27.2	21.0	31.1
STD		13.8	21.0	21.4	23.0	21.7	21.7	21.8	20.6	18.3	16.2	21.5

continued

APPENDIX TABLE A-1

continued

INDUSTRIAL MARKET ECONOMIES

COUNTRY	YEAR	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	ALL AGES
AUSTRALIA	*85	58.1	73.5	57.7	57.7	61.4	61.4	50.2	50.2	27.1	11.1	33.0
AUSTRIA	81	46.7	69.8	62.2	59.1	59.9	62.2	58.2	50.8	25.8	5.5	54.0
CANADA	*85	52.1	74.9	70.7	70.7	70.0	70.0	61.3	61.3	33.8	33.8	33.0
DENMARK	85	61.0	82.1	86.9	88.8	86.4	84.7	80.3	71.1	57.3	25.6	44.0
FINLAND	85	37.2	71.4	83.2	85.5	88.7	90.8	89.2	83.3	66.5	38.9	56.0
FRANCE	84	13.7	66.0	72.8	67.8	67.3	64.9	61.0	54.1	41.4	18.0	45.0
IRELAND	84	33.7	75.2	52.2	30.9	24.2	25.8	25.3	25.8	21.1	15.3	36.0
ITALY	**85	25.9	59.6	58.6	56.9	51.6	46.0	40.4	32.7	20.8	10.2	30.0
JAPAN	85	16.6	71.9	54.1	50.6	60.0	67.9	68.1	61.0	51.0	38.5	56.0
NETHERLANDS	86	25.5	71.7	62.9	48.0	47.8	48.5	42.4	31.1	20.7	8.9	26.0
NEW ZEALAND	81	49.5	63.7	42.3	39.9	49.2	54.9	53.0	44.3	31.6	12.1	32.0
NORWAY	85	45.8	87.7	72.5	73.8	77.1	80.3	79.2	72.6	60.0	46.2	28.0
SPAIN	85	31.8	55.1	54.3	41.0	33.6	30.8	27.5	24.4	23.6	16.1	21.0
SWEDEN	85	48.3	81.3	87.3	88.4	89.2	92.1	90.5	85.6	74.4	46.4	39.0
UNITED KINGDOM	81	45.0	69.4	55.5	53.4	62.3	68.4	68.1	63.1	51.9	22.4	44.0
UNITED STATES	85	41.4	70.9	70.4	69.7	70.9	72.6	67.5	60.5	50.2	33.0	44.0
MEAN		39.4	70.3	65.2	61.4	62.5	63.8	60.1	54.5	41.1	23.9	38.8
STD		13.4	6.8	12.7	17.0	18.1	18.7	19.1	18.5	17.3	13.4	10.4

Source: Yearbook of Labor Statistics-1985, International Labor Office, Geneva.
Yearbook of Labor Statistics-1986, International Labor Office, Geneva.

Notes: * Equal values are interpolated because of pooled age groups in source.
** Age group [14-19] instead of [15-19].
*** Age group [10-19] instead of [15-19].
. Not available.
@ Value above 100 is due to the age adjusteent. See Appendix B.

APPENDIX TABLE A-2

SELECTED COUNTRY STATISTICS

REGION	COUNTRY	FEMALE LITERACY RATE (1980)	FEMALE ENROLLMENT RATIO		FERTILITY RATE (1981)	RELIGION
			PRIMARY	SECONDARY		
SUB-SAHARA AFRICA:						
	BOTSWANA	70.0	103.0	27.0	6.5	C
	CHAD	11.0	21.0	2.0	5.5	M
	COMOROS	.	76.0	15.0	.	M
	ETHIOPIA	5.0	29.0	8.0	6.5	M
	GAMBIA	15.0	55.0	13.0	6.5	M
	GUINEA-BISSAU	17.0	41.0	2.0	.	M
	MADAGASCAR	62.0	88.0	10.0	6.5	C
	MALAWI	31.0	53.0	2.0	7.8	C
	MAURITIUS	77.0	24.0	.	.	H
	MOZAMBIQUE	33.0	64.0	3.0	6.5	C
	NIGER	9.0	14.0	1.0	7.0	M
	NIGERIA	31.0	.	.	.	M
	REUNION	.	.	.	.	R
	RWANDA	46.0	61.0	1.0	8.3	R
	SAO TOME & PRINCIPE	.	.	.	.	R
	SENEGAL	19.0	44.0	8.0	6.5	M
	SEYCHELLES	.	.	.	.	R
	SUDAN	20.0	34.0	8.0	6.7	M
	TANZANIA	70.0	86.0	2.0	6.5	M
	ZAMBIA	67.0	92.0	12.0	6.9	C
	ZIMBABWE	67.0	.	.	.	C
MIDDLE-EAST, NORTH AFRICA & OIL EXPORTERS:						
	ALGERIA	33.0	83.0	39.0	7.3	M
	BAHRAIN	54.0	109.0	79.0	.	M
	BRUNEI	.	.	.	.	M
	EGYPT	30.0	69.0	39.0	4.8	M
	IRAN	39.0	95.0	35.0	6.0	M
	IRAQ	41.0	109.0	38.0	7.0	M
	JORDAN	63.0	102.0	73.0	7.3	M
	KUWAIT	58.0	100.0	75.0	.	M
	MORROCO	22.0	62.0	25.0	6.9	M
	SYRIA	43.0	98.0	47.0	7.4	M
	UNITED ARAB EMIRATES	19.0	87.0	46.0	.	M

continued

APPENDIX TABLE A-2

continued

REGION	COUNTRY	FEMALE LITERACY RATE (1980)	FEMALE ENROLLMENT RATIO		FERTILITY RATE (1981)	RELIGION
			PRIMARY	SECONDARY		
ASIA & PACIFIC:						
	AMERICAN SAMOA	.	.	.	.	.
	BANGLADESH	25.0	55.0	11.0	6.4	M
	CHINA	.	107.0	31.0	2.9	F
	FIJI	81.0	109.0	79.0	3.3	C
	HONG KONG	.	104.0	72.0	2.2	N
	INDIA	33.0	66.0	20.0	4.8	H
	INDONESIA	66.0	100.0	23.0	4.4	M
	KOREA, REPUBLIC OF	90.0	99.0	88.0	3.0	F
	MALAYSIA	66.0	95.0	47.0	4.0	M
	MALDIVES	.	.	.	.	M
	NEPAL	9.0	48.0	9.0	6.4	H
	PAKISTAN	22.0	29.0	8.0	6.4	M
	PHILIPPINES	91.0	107.0	71.0	4.6	R
	SINGAPORE	74.0	113.0	73.0	1.7	B
	SRI LANKA	.	95.0	52.0	3.5	B
	THAILAND	87.0	97.0	28.0	3.9	B
	VANUATU	.	.	.	.	C
	WESTERN SAMOA	.	.	.	.	C

continued

APPENDIX TABLE A-2

continued

REGION	COUNTRY	FEMALE LITERACY RATE (1980)	FEMALE ENROLLMENT RATIO PRIMARY	FEMALE ENROLLMENT RATIO SECONDARY	FERTILITY RATE (1981)	RELIGION
LATIN AMERICA & CARIBBEAN:						
	ARGENTINA	95.0	107.0	69.0	2.8	R
	BAHAMAS	.	.	.	.	C
	BARBADOS	98.0	108.0	94.0	2.5	C
	BELIZE	.	.	.	.	R
	BERMUDA	.	.	.	.	C
	BOLIVIA	65.0	85.0	34.0	6.0	R
	BRAZIL	76.0	97.0	36.0	4.0	R
	CHILE	92.0	106.0	69.0	3.0	R
	COSTA RICA	93.0	100.0	45.0	3.5	R
	CUBA	93.0	105.0	76.0	.	R
	DOMINICA	.	.	.	.	R
	DOMINICAN REPUBLIC	77.0	.	.	.	R
	ECUADOR	80.0	.	.	.	R
	FRENCH GUIANA	.	.	.	.	R
	GUADELOUPE	.	.	.	.	R
	GUATEMALA	47.0	63.0	15.0	5.3	R
	GUYANA	95.0	99.0	62.0	3.6	C
	HAITI	29.0	64.0	12.0	4.7	R
	HONDURAS	66.0	101.0	36.0	6.6	R
	JAMAICA	95.0	101.0	64.0	3.8	C
	MARTINIQUE	.	.	.	.	R
	MEXICO	84.0	119.0	45.0	5.0	R
	NETHERLANDS ANTILLES	.	.	.	.	R
	PANAMA	89.0	104.0	65.0	3.8	R
	PARAGUAY	85.0	97.0	20.0	4.3	R
	PERU	78.0	111.0	54.0	5.1	R
	PUERTO RICO	.	.	.	.	.
	ST CHRISTOPHER & NEV	.	.	.	.	C
	TRINIDAD AND TOBAGO	95.0	98.0	78.0	2.5	R
	URUGUAY	95.0	106.0	61.0	2.8	R
	VENEZUELA	81.0	108.0	49.0	4.4	R

continued

APPENDIX TABLE A-2

continued

REGION	COUNTRY	FEMALE LITERACY RATE (1980)	FEMALE ENROLLMENT RATIO		FERTILITY RATE (1981)	RELIGION
			PRIMARY	SECONDARY		
INDUSTRIAL MARKET ECONOMIES:						
	AUSTRALIA	99.0	106.0	95.0	1.9	C
	AUSTRIA	99.0	98.0	75.0	1.6	R
	CANADA	99.0	102.0	91.0	1.8	R
	DENMARK	99.0	97.0	104.0	1.7	C
	FINLAND	99.0	103.0	109.0	1.6	C
	FRANCE	99.0	110.0	92.0	1.9	R
	GERMANY, FEDERAL REP	99.0	.	.	.	C
	IRELAND	98.0	99.0	96.0	3.2	R
	ITALY	95.0	103.0	73.0	1.9	R
	JAPAN	99.0	101.0	95.0	1.7	B
	LUXEMBOURG	98.0	.	.	.	R
	NETHERLANDS	99.0	96.0	100.0	1.6	C
	NEW ZEALAND	99.0	107.0	84.0	2.1	C
	NORWAY	99.0	100.0	96.0	1.8	C
	SPAIN	92.0	109.0	88.0	2.5	R
	SWEDEN	99.0	97.0	90.0	1.7	C
	SWITZERLAND	99.0	. .	.	.	C
	UNITED KINGDOM	99.0	104.0	85.0	1.8	C
	UNITED STATES	99.0	100.0	95.0	1.8	C
SOUTHERN EUROPE:						
	GREECE	86.0	102.0	76.0	2.3	C
	ISRAEL	93.0	97.0	71.0	3.3	J
	PORTUGAL	80.0	111.0	52.0	2.3	R
	TURKEY	56.0	.	.	.	M
	YUGOSLAVIA	83.0	98.0	80.0	2.2	C

Legend: C Christian
R Roman Catholic
M Muslim
H Hindu
J Judaism
B Buddhist
F Confucianism

Source: -"The World Factbook, Nineteen Hundred & Eighty Six", Central Intelligence Agency, June 1986.
-"World Tables", The Third Edition, Vol.II, The World Bank.
-World Bank Database, Comparative Analysis and Data Division, Economic Analysis and Projections Department, The World Bank.

APPENDIX B

Total Labor Force Participation Rate

This is defined as the number of persons in the labor force divided by the population of all ages. The total participation rate was subsequently divided by the ratio of the population aged 15-64 to the total population of all ages, in order to adjust the total labor force participation rate for the size of the population who are of working age.

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore

Age-Specific Labor Force Participation Rate

This is the ratio of the labor force in an age group to population in the same age group.

Source: International Labor Office, The Yearbook of Labor Statistics, 1985 and 1986 editions, Geneva.

Literacy Rate

This is the number of adults with the ability to both read and write expressed of a percentage of the adult population aged 15 years and over.

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore.

Labor Force in Agriculture

This is the share of persons in the labor force engaged in agricultural activities, including farming, forestry, hunting and fishing.

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore.

Urbanization

This is the percentage of the population who live in cities and towns (based on national definitions).

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore.

Regional and Income Dummies

The countries were classified according to the definitions adopted by the World Bank.

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore, pp. xix-xx.

Education Expenditure

This is public expenditure on education a percentage of all public expenditure.

Source: Unesco, Statistical Yearbook, 1983.

School Enrollment

This is the ratio of students of all ages in primary or secondary education to the population of primary or secondary school age (6-11 or 12-17 years). For countries with universal education the primary enrollment ratio may exceed 100 percent because some pupils are below or above the official school age.

Source: World Bank (1983) World Tables, Volume II, Social Data, 3rd edition, John Hopkins University Press, Baltimore.

University Enrollment

Number enrolled in higher education as a percentage of the population aged 20-24.

Source: World Bank, World Development Report, Oxford University Press, 1986.

Religion

The source for religion classification is "The World Factbook, Nineteen Hundred and Eighty Six," Central Intelligence Agency, June 1986. A country was classified under a given religion if thirty or more percent of the population are followers and the rest of the population belongs to various other religions. Roman Catholic is classified as different from other Christian denominations. Ireland, for example, with 96 percent of the population Roman Catholics, is classified as Roman Catholic , while the Federal Republic of Germany with 45 percent Roman Catholics and 44 percent Protestants, is classified as Christian.

APPENDIX C

Estimation of the Difference Between the Participation Rates of Literate and Illiterate Women

Define the female labor force participation rate as

$$LFPR = p \frac{LIT}{ALL} + p' \frac{ILL}{ALL} \qquad (1)$$

where

LFPR = aggregate labor force participation rate of women

p = participation rate of literate women

p' = participation rate of illiterate women

LIT = number of illiterate women in the economy

ILL = number of illiterate women in the economy

ALL = number of women in the economy

If $k = p/p'$ then (1) becomes

$$LFPR = p' \left(1 + (k-1) \frac{LIT}{ALL}\right) \qquad (2)$$

and on the assumption that (k - 1) LIT/ALL is sufficiently small, the following approximation should hold

$$\ln(LFPR) = \ln(p') + (k-1) \frac{LIT}{ALL} \qquad (3)$$

If one runs a regression of the logarithm of the labor force participation rate upon a constant and the female literacy rate then the regression coefficient on the literacy rate should be equal to the proportional difference between the participation rates of literate and illiterate women.

The technique will be if valid a number of conditions are satisfied. First, the participation rate of the illiterate women must be the same across countries.

Secondly, the length of schooling should either be the same both a cross and within countries or should not affect the participation decision (the difference in the participation rates should arise solely because some women go to school irrespective of how long they stay at school).

Thirdly, the type of schooling (general versus vocational, arts versus sciences) should have no separate effect upon participation.

APPENDIX D

Religion and Female Participation

Independent Variable	Coefficient
Confucianism	.030
Hindu	-.152 *
Buddhist	.064
Muslim	-.184 **
Roman Catholic	-.104 **
No major religion	.026
Constant	.348 **
R^2	34
N	90

Notes: The omitted group was Christian, non-Catholic.
** Significant at the 5 percent level.
* Significant at the 10 percent level.